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Keratin/PEO blend nanofibres production by electrospinning process.

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Electrospinning for the formation of very fine fibers has been actively explored recently for potential applications in different areas, ranging from thecnical textiles (e.g. filters, composites, reinforcement, protective fabrics, etc.) to biomedical devices (scaffolds for cell growth, vascular grafts, wound dressing or tissue engineering) where biocompatible polymers play an essential role[1,2]. Many works deal with electrospinning of protein, such as collagen[3], silk[4] and silklike protein[5], but few of them report on keratin although it is the major component of hair, wool, feather, nail, horns and other epithelial coverings. Moreover, the disposal of fibre by-products from the textile industry, poor quality raw wools not fit for spinning, hairs and feathers from butchery, involves environmental and economic complexation in consideration that an annual crop of more than 3 million tons of keratin has been estimated from data related only to domestic species.
The aim of this study is to develop nanofibres nonwovens composed of keratin protein extracted from wool using urea, m-bisulphite and sodium dodecyl sulphates. These materials could have interesting application in biomedical field, particularly for the production of scaffolds for cell growth and wound dressing. In fact, it is known that regenerated keratin films degrade both in vitro and in vivo and they support well the growth of mouse fibroblast cells. Unfortunately, keratin films prepared by casting keratin acqueous solution were fragile to handle. Therefore, to improve the keratins processability, poly(ethylene-oxide) (PEO) with molecular weight of 400.000 was blended with wool keratin.
PEO is well documented as a biocompatible polymer and has been successfully blended with collagen and silk fibroin in electrospinning[6].
Several compositions of the keratin/PEO acqueous blends were electrospun in different operating conditions. The nanofibres obtained were characterized by SEM, FT-IR and DSC analyses and compared with films of the same materials produced casting with the aim of investigating structural changes due to electrospinning process.

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